

SYSTEM AND METHOD FOR MEASURING OPTICAL DISTANCE  
ABSTRACT OF THE DISCLOSURE

The methods of the present invention are directed at an accurate phase-based technique for measuring arbitrarily long optical distances with sub-nanometer precision.

5 A preferred embodiment of the present invention method employs a interferometer, for example, a Michelson interferometer, with a pair of harmonically related light sources, one continuous wave (CW) and a second source having low coherence. By slightly adjusting the center wavelength of the low coherence source between scans of the target sample, the phase relationship between the heterodyne signals of the CW and low

10 coherence light is used to measure the separation between reflecting interfaces with sub-nanometer precision. As the preferred embodiment of this method is completely free of  $2\pi$  ambiguity, an issue that plagues most phase-based techniques, it can be used to measure arbitrarily long optical distances without loss of precision.